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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/387,961	11/22/1999	PAUL A JAKOBSON	JAKOBSON-6	3219

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EXAMINER
CUNNINGHAM, STEPHEN C

ART UNIT	PAPER NUMBER
3663	11

DATE MAILED: 11/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

SK

Office Action Summary	Application No.	Applicant(s)	
	09/387,961	JAKOBSON ET AL.	
	Examiner	Art Unit	
	Stephen C. Cunningham	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 July 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,15-18,31 and 35-37* is/are rejected.

7)☒ Claim(s) *10-14,19-30 and 32-34* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 September 1999* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *15 July 2002* is: a)☐ approved b)☒ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

The corrected or substitute drawings were received on 7-15-02. These drawings are not accepted.

The drawings are objected to because the labels are not descriptive and numbered, for an example please see Flood et al Patent number 6,134,047. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

1. Claims 1-3, and 15-17, 31, 35, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maxham in view of Csipkes et al. in view of Iwano et al.

   With respect to claim 1, Maxham teaches an apparatus comprising:

   a support board (either the backplane or the frontplane);

   a subunit comprising a plurality of amplification components;

   a subunit comprising a plurality of input stage components; and

   a subunit comprising a plurality of output stage components.

   See figures 3 teaching an apparatus comprising: input and output modules

50 and 48; and amplification modules 30 and 32, and figure 4 teaching the input output modules comprising a plurality of components.

Iwano et al. teach pluggable connectors that connect a printed board to an optical backplane. Constructing an optical circuit on a printed board is well known in the art.

Csipkes et al. teach a modular amplifier comprising a separate pump module, see the abstract.

It would have been obvious to modify the apparatus by constructing each optical module on a printed circuit board with pluggable connectiors in order to facilitate connection with the backplane and to further modify the apparatus by providing a pump module separate from the amplification module in order to facilitate pump module replacement for example in case of pump module failure.

With respect to claim 2, Maxham teaches that the amplification module is optically connected to each of the input/output modules and the pump module.

With respect to claim 3, Maxham teaches a plurality of second stage amplification components, see figures 3 and 4.

With respect to claim 15, Maxham teaches providing a plurality of different pump units, different optical signal amplifying subunits, different input subunits, and different output subunits.

Csipkes et al. teach providing separate modular pump subunits.

Maxham further teaches selecting a desired subunit from each of the pump, amplifying, input, and output subunit groups and connecting each of the desired subunits to form a desired amplifier. For example see figure 3, long-band amplification module 30, and short-band amplification module 32, each of which have a two pump sources; figure 5 shows, in network elements 22 and 74, input modules comprising one-way multiplexers and output modules comprising one-way demultiplexers; and network element 3 teaches bi-directional multiplexers functioning as input or output modules depending on the direction of signal transmission.

Iwano et al. teach a pluggable optical connector. It would have been obvious to modify the method of making by providing separate pump modules in order to provide easy replacement for faulty pumps; and to further modify by providing pluggable type connections between each of the modules in order to provide simple connection to the backplane.

With respect to claim 16, Maxham teaches providing a design for a first through fourth amplifier utilizing a plurality of optical components. See figures 3, 4, and 5. Each of the amplifiers from figures 3 and 4 may be incorporated modified to fit into the amplifiers of figure 5.

With respect to claim 17, it would have been obvious to divide the components into functional groups in order to provide an organized inventory.

With respect to claim 18, it would have been obvious to further divide the pump modules into a first subgroup with pumps of wavelength λ_1 and a second subgroup with pumps of wavelength λ_2 in order to further organize inventory.

With respect to claim 31, Maxham teaches an apparatus comprising:

a support board (either the backplane or the frontplane);

a subunit comprising a plurality of amplification components;

a subunit comprising a plurality of input stage components; and

a subunit comprising a plurality of output stage components.

See figures 3 teaching an apparatus comprising: input and output modules 50 and 48; and amplification modules 30 and 32, and figure 4 teaching the input output modules comprising a plurality of components.

Iwano et al. teach pluggable connectors that connect a printed board to an optical backplane. Constructing an optical circuit on a printed board is well known in the art.

Csipkes et al. teach a modular amplifier comprising a separate pump module, see the abstract.

It is well known in the art that modules, connected to a backplane, may be arranged on a board in order to provide support for the optical components and easy connection to the backplane (similar to card connections to a motherboard in a computer).

With respect to claim 35, Maxham teaches an apparatus comprising:

a support board (either the backplane or the frontplane);

a subunit comprising a plurality of.amplification components;

a subunit comprising a plurality of input stage components; and

a subunit comprising a plurality of output stage components.

See figures 3 teaching an apparatus comprising: input and output modules 50 and 48; and amplification modules 30 and 32, and figure 4 teaching the input output modules comprising a plurality of components.

Iwano et al. teach pluggable connectors that connect a printed board to an optical backplane. Constructing an optical circuit on a printed board is well known in the art.

Csipkes et al. teach a modular amplifier comprising a separate pump module, see the abstract.

It would have been obvious to test the power and wavelength of each pump module for matching specifications and functionality;

to assemble, connect to a known signal source, and to measure the signal present at said output end of each input and output module;

to assemble, connect to a test information signal, connect to a pump source, and to measure the signal at the output end of the signal amplifying module;

to reject any module that does not meet performance requirements, or accept modules that meet requirements;

to mount accepted amplifying, input, output, and pump module on a substrate,

connect each module;

and to test each module

in order to construct an modular optical amplifier that is known to have properly functioning components.

With respect to claim 36, it would have been obvious to mount a second accepted pump module on said substrate;

optically connect said pump module to said amplifying module; and

to test said second accepted pump module on said substrate in order to supply an additional optical power source to the amplifier wherein the functionality of the optical power source is verified and to allow for a soft shutdown.

2. Claims 4, 6, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maxham in view of Csipkes et al. in view of Iwano et al. as applied to claim 1 above, and further in view of Ohshima et al.

With respect to claim 4, Ohshima et al. teach a pumping module where a plurality of pumping sub-modules are coupled together. See figures 1a, 4, and 8-13. It would have been obvious to modify the

apparatus by supplying a plurality of pump modules coupled together in order to provide redundancy.

With respect to claim 6, Ohshima et al. teach that the first and second pump wavelengths are approximately equal, see paragraph 0009.

With respect to claim 7, Ohshima et al. teach that the first and second pump wavelengths are different, see paragraph 0009.

3. Claims 5, 8, and 9 rejected under 35 U.S.C. 103(a) as being unpatentable over Maxham in view of Csipkes et al. in view of Iwano et al. further in view of Ohshima et al. as applied to claims 4, 6 and 7 above, and further in view of Becker et al.

With respect to claims 5, Maxham teaches a dual-stage amplifier module. Ohshima teaches a wavelength-division multiplexing coupler (WDM coupler) serially connected to a first rare-earth doped fiber that is serially connected to an optical isolator. Becker et al. teach that a gain flattening filter should be placed between the first and second stages of a dual stage optical amplifier in order to compromise between noise and power. It would have been obvious to modify the apparatus by providing a first WDM coupled to a rare-earth doped fiber coupled to an isolator, as taught by Ohshima et al, said isolator coupled to the gain flattening filter of Becker et al. coupled to the WDM (providing pump light to the second stage amplifier of Maxham) coupled to a second rare earth doped fiber (the second stage amplifier gain medium) in order to provide a gain

flattened low noise high power dual stage optical amplifier. See Maxham, figure 3; Ohshima et al. figure 4; and Becker et al. pages 265-268, 273-278, and 291-293.

With respect to claim 8, Becker et all teaches pumping with 980 nm pump light to provide efficient amplification, see page 265. It would have been obvious to modify the apparatus by pumping with 980 nm pump light in order to provide efficient amplification.

With respect to claim 9, Becker et al. teach that 980 nm pumping light provides low noise, and 1480 nm light provides highly efficient power amplification. It would have been obvious to modify the apparatus by coupling 980 and 1480 nm light in order to provide a compromise between noise and power in amplification.

4. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Csipkes et al. in view of Iwano et al.

Csipkes et al. teach an method comprising the steps of:

providing at least four functional groups of subunits, at least one functional group containing at least n different types of sub-units ($n \geq 2$); and

depending on the specification of the amplifier, selecting a specific sub-unit and connecting each of said selected sub-units. In the case of Csipkes e t al, the functional groups are input stage amplifier, intermediate service channel stage, post stage amplifier, and pump. There are

disclosed at pump modules of 980 nm wavelengths and 1480 nm wavelengths. Iwano et al. teach a pluggable type connector. It would have been obvious to modify the apparatus of Csipkes et al. by connecting each of the units via a pluggable connector in order to provide a simple means for connecting the amplifier modules.

Allowable Subject Matter

5. Claims 10-14, 19-30, and 32-34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

With respect to claims 10-14, the prior art, for example Maxham et al. patent number 6,411,407 and Csipkes et al. patent number 5,778,132, teach a modular optical amplifier apparatuses wherein the input components including a tap coupler serially connected to a photodiode are located in the optical amplification module rather than an/the input components module. The prior art also fails to teach or suggest a benefit of modifying the apparatus by moving the tap into an/the input components module with all of the limitations as claimed.

With respect to claims 19-30, the prior art fails to teach an optical amplifier component groups wherein each component group includes a

maximum number of components common to each of the first, second, third, and fourth optical fiber amplifiers; and

forming an optical signal amplifying components subset group, and input components subset group, an output components subset group, each components subset group having the minimum number of said optical component common to each of said respective components groups for each of said first through fourth optical fiber amplifiers. The art fails to teach or suggest grouping each component subset group having a minimum number of optical components common to each amplifier design.

With respect to claims 32-34, the nearest prior art is Maxham. The prior art fails to teach or suggest alternative modules of alternative components which may be substituted for the initial modules in order to make a different optical amplifier, as claimed by the applicant.

Remarks

The objection to claim 2 has been overcome and is withdrawn.

The rejections of claims 19-20 based on §112 are withdrawn.

The examiner acknowledges the declaration and withdraws the rejections based on the Flood et al. '047 reference new rejections have been set fourth.

Response to Arguments

The arguments with regards to the Flood et al. '047 reference are moot.

With respect to the applicants argument that the Iwano reference discloses a specific connector for use with a printed board and a back panel the housing of the modules are considered to comprise a back-panel.

The applicant argues, with respect to claim 4, that the use of plural pumps for flexible pumping is the applicants invention. The Examiner has clarified in the rejection that the motivation for plural pump sources is redundancy. Redundant pumping is well known in the art.

The arguments with respect to claims 5, 11, 13, 14, 15 and 37 are moot.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Nakabayashi

Fee et al.

Yoneyama

Martin

Van Deventer.

Bergano et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen C. Cunningham whose telephone number is 703-605-4275. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G Black can be reached on 703-305-8233. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9326 for regular communications and 703-872-9327 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.

October 29, 2002

THOMAS G. BLACK
SUPERVISORY PATENT EXAMINER
GROUP 3600